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Research on Water cycle Impact of South-to-North Water Diversion Project to Handan District Using MODCYCLE Model

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South-to-North Water Diversion Project is a huge interbasin water transfer project which is being constructed in China. The purpose of the project is to solve water scarcity crisis in North China. What is the water cycle response of local water cycle system to transferred water is an important topic which needs in-depth research. For this purpose, the article selected Handan district as the representative area of North China, and use MODCYCLE model as the simulating tool to do the study. MODCYCLE model is a half-distributed basin scale hydrologic / water cycle model developed by IWHR, its main simulating theory is similar to the world widely used SWAT model. MODCYCLE is developed by Object Oriented Programming method in C++ language and its input and output is based on database. A remarkable character of the model is that it supports parallel computing. Under multicore environment, the model's computing efficient will be dramatically enhanced. Furthermore, some important water cycle processes such as water surface-ponding on soil top, is considered in the model. Firstly during the study, the research simulated the water cycle process of Handan district in present situation by a 10 years dataset from 1998 to 2007. In this process the model's main parameters were being calibrated. Then based on the calibrated model and correspond to the water demand development predictions in the future, three different scenarios were simulated. These scenarios were set on different water use assumptions and strategies. By compare the scenario's forecast results, acknowledge of the role played by transferred water in the whole water cycle system of Handan district were figured out, as well as the water cycle evolution trends under different scenarios. The research indicated that the allocated transfer water of 0.47 billion m3 to Handan district during the coming first-stage water transfer plan of the project can only relieve the degradation rate of the water cycle system, mainly reflected in reduction of groundwater overdrawn, but is insufficient for the water cycle system to recover. The solution of water shortage problem in Handan district in the future will depend on both the suppression of local water consume and increased allocated water in the second-stage water transfer plan of South-to-North Water Diversion Project.